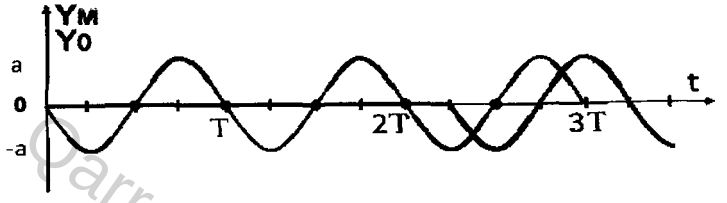
b- $y_M(t) = y_0(t-\theta)$ avec $\theta = \frac{x}{v}$

$$= a\sin(\omega t - \frac{2\pi x}{\lambda} + \varphi_0) \quad \text{si } t \geq \theta$$

$$y_M(t) = 2.10^{-3}\sin(200\pi t - \frac{2\pi 22,5}{10} + \pi) \quad \text{si } t \geq \theta$$

$$\begin{cases} y_M(t) = 2.10^{-3}\sin(200\pi t + \frac{\pi}{2}) & \text{si } t \geq \theta \\ y_M(t) = 0 & \text{si } t<0 \end{cases}$$

c-



$$\frac{\theta}{T} = \frac{x}{v.t} = \frac{x}{\lambda} = \frac{22,5}{10} = 2,25 \Rightarrow \theta = 2,25T$$

d/ $V_M = \frac{dy_M}{dt} = \omega a\cos(\omega t + \varphi_M)$

$V_m(M) = \omega a = 200\pi \times 2.10^{-3} = 1,25 m.s^{-1}$

3) $\varphi_M - \varphi_{M'} = \frac{-2\pi}{\lambda}(x_M - x_{M'})$

$$= \frac{-2\pi}{10}(22,5-35) = 2,5\pi = \frac{\pi}{2}$$

M vibre en quadrature avance de phase par rapport à M'.

7

1)a- $N = \frac{1}{T}$; T=$2.10^{-2}s$

$$N = \frac{1}{2.10^{-2}} = 50Hz$$

Qarray.tn -Aqra Blech- Qarray.tn